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ABSTRACT

With great emphasis on global learning and the greater influx of diverse international students into the community colleges, science instructors need more than ever before to make their classrooms culturally aware. This microbiology course includes a brief introduction to the role of bacteria and micro-organisms in industry, agriculture, and infections. The course will examine "Endemic" (localized in certain countries) and "Pandemic" (world-wide) microbial infections and diseases. Understanding microbial theories of diseases in certain societies, cultures, and countries is important because in helps explain the disease-causing process, effects of geographical locations, and the evolutions of microorganisms. The course also discusses the historical analyses of disease transmission, epidemiological studies and global control mechanisms of diseases. In addition, it will focus on the importance of multicultural/international education and cover some of the terminology involved in such education. The document includes: (1) course description; (2) course objectives; (3) course outline; (4) course materials; (5) teaching strategies and classroom presentation; (6) course requirements and evaluation of students; (7) grading procedure; and (8) suggestions for multicultural/international curricula and syllabi for science classes. Contains 18 references. (ZWH)

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THERE IS A NEW WORLD OUT THERE:

INTERNATIONALIZING THE SCIENCE CURRICULA

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INTERNATIONALIZED/MULTICULTURALIZED SYLLABUS

MICROBIOLOGY

BI161, 3 CREDIT HOURS

SAM ELASHKAR, Ph.D.

COURSE DESCRIPTION

The morphology, growth, taxonomy, distribution and cultivation of bacteria and related micro-organisms is studied. The course includes a brief introduction to the role of bacteria and micro-organisms in industry, agriculture and infections.

With the great emphasis on global learning and the greater influx of diverse international students into the community colleges, the Science Instructors need more than ever before, to make their classrooms culturally aware.

The course will examine **Endemic** (localized in certain countries) and **Pandemic** (world-wide) microbial infections and diseases. Understanding microbial theories of diseases in certain societies, cultures and countries is important because it helps us explain the disease-causing process, effects of geographical locations, and the evolutions of microorganisms.

This course discusses the historical analyses of disease transmission, epidemiological studies and global control mechanisms of diseases. In addition, this class will focus on the importance of multicultural/international education and covers some of the terminology involved in such education.

COURSE OBJECTIVES

1. To introduce the student to the basic principles of a general survey of microbiology with application to clinical medicine.

2. To relate the student's study of microbiology to other basic sciences (i.e. biological chemistry, nutrition, physiology and anatomy).

3. To furnish the student with a foundation for advanced study in microbiology and application of the basic principles of microbiology to their chosen profession.

4. The laboratory will be utilized to study the biochemical reactions of various bacteria's metabolism. This will be the basis of integrating lecture to laboratory and identification of various species of bacteria. Furthermore, the laboratory will furnish the student with knowledge of various physical and chemical agents that affect bacterial growth and death.

5. To make the instructor as well as the students at the community college aware that there is a world out there to be discovered and explored.

6. To widen the students' scope of learning by discussing various global cultures and scientific problems.

7. To bring out and discuss examples of diversities and harmony in the world of difference, this in turn will help students to appreciate differences more and more.

8. Specific objectives in the areas of science: e.g., evolution of mankind and animals, contributions of the international scientists to the biomedical areas, global standardized means to control infections and diseases, collaborative efforts of countries to diagnose world epidemics, world-wide immunization regimens, new progresses and advancements in science and medicine, different cultures' diets and nutrition, effects of geographical location on people's health and well-being, different habits and customs of people of the world, differences of anatomical and physiological characteristics of the human body.

9. To establish useful interactions and open channels of communication between American and International students in a classroom group discussions and reports.

10. To educate International students about our culture. This will prepare them to act as goodwill ambassadors when they ~~go back~~ to their countries.

11. To teach students tolerance, collaboration, cooperation, and working together in harmony regardless of our national origin, color, race, gender which our constitution dictates.

12. To teach students fundamental scientific principles characteristic of all living organisms and at all levels from molecular to global.

13. To increase the commitment and enthusiasm by students to learning with state of the art equipment and using multimedia and multicultural instructional methods.

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14. To use and utilize the expertise of the multicultural/ international diversity of students and faculty in the classroom by providing first hand experiences.

15. To develop the recognition in the students that we live in a multicultural nation and in an interdependent world.

16. To broaden the students' awareness of the profound contributions of non-Western societies to Western civilization.

17. To enhance students' knowledge of both Western and non-Western societies.

18. To realize that microbial and tropical infections/ diseases exist in various countries of the world.

19. To compare different immunizations procedures that take place in various countries.

20. To understand why certain countries have local diseases and microbes that don't exist in the United States.

21. To become familiar with different global-sanitary measurements and means to control infections.

22. To be knowledgeable of various world health issues regarding public safety and people education about diseases and germs in general.

23. To analyze the various scientific and medical technologies in different parts of the world; e.g., immunization shots, genetic bio-technology, gene cloning.

24. To study the common global health and disease problems and the roles of World Health Organization (WHO) and Communicable Disease Centers (CDC) in combating diseases.

25. To discuss the contributions of the world famous microbiologists to the biomedical fields; e.g., Pasteur of France, Koch of Germany, Salk and Sabin of the USA, Shiga of Japan, etc.

26. To become aware of the means of disease/microbe spreading between countries and continents of the world and ways to prevent this vicious cycle.

27. To study the mechanisms of microbial evolution and mutations in different parts of the globe.

28. To study various international, differential diagnosis techniques; e.g., microbial screening tests, biochemical lab tests, etc.

29. To explore the effects of economical status, family structure, social problems and cultural behaviors on contracting infections.

30. To study different governments' rules and policies toward highly infectious microbial diseases; e.g., USA with regard to patients with AIDS inside or outside the US, Cuba's handling of AIDS patients, Scandinavian countries and people with T.B.

31. To discuss various quarantine measures regarding world travelers and imported animals, birds, and perishable items.

COURSE OUTLINE

A. Introduction to Science
B. Places of Micro-organisms in the Living World
C. Morphology of Bacteria
D. Nomenclature of the Bacteria with related diseases of the World
E. Metabolism of Bacteria with application to human nutrition:
    1. Enzymes
    2. Oxidation-Reduction processes
    3. Chemoorganotrophic metabolism:
        a. fermentation
        b. respiration
        c. anaerobic respiration
    4. Gluocose metabolism:
        a. glycolysis (Emp)
        b. fermentation
        c. entner douderoff and phosphoketolase
        d. aerobic respiration
        e. catabolisism of lipids
        f. alternate substrates of carbon
        g. amino acid utilization
        h. relationship of intermediary metabolism to other pathways
        i. anaerobic respiration
        j. cell wall biosythesis of peptidoglycan
F. Genetics: Various global traits, harmony in gene structure
    1. Chemistry of DNA
    2. Replication of DNA
    3. Replication of Bacterial chromosome
    4. Expression of genetic information in DNA
    5. Control of Enzyme activity and synthesis (i.e. protein synthesis)
    6. Gene Mutations and Global Genetic Disorders
    7. Genetic recombination and World Biotechnology

G. Immunology:

1. Host-Microbe relationships
2. Virulence
3. Normal Flora
4. Factors influencing infection
5. Modes of transmission & Epidemiology
6. Resistance and immunity:
   a. natural resistance (species, racial, individual, geographical and external defense mechanisms)
   b. internal defense mechanisms
   c. antibody mediated immunity - mechanism
   d. cell-mediated immunity mechanisms
   e. hypersensitivities
   f. non-specific immunity blood cells involved, complement, phagocytosis

H. World Microbes and Global Microbial infections:

1. Pandemic infections: means of transmission and control
2. Microbes that cause epidemics in certain countries
3. Difference in the microbial world based on geographical location, social, racial, genetic, economic factors
4. Ways and means to prevent world-wide epidemics
5. Concerted efforts of World Health Organizations to cooperate, collaborate in combating infections, supply medicines and antibiotics.
6. International Immunization procedures against world-wide microbes (e.g., flu, common colds, Herpes simplex, Hepatitis, small pox, polio, tetanus, etc)
7. Gene cloning and Biotechnological international issues
8. Biomedical/health global ethical issues
9. Shared world scientific advances, progresses, discoveries and inventions
10. International/national conferences and meetings on health and microbial issues

COURSE MATERIALS

I. Course text book required: Basic Microbiology; Wesley A. Volk and Margaret F. Wheeler, Harper & Row

II. Course VHS tape series and slide presentations:

1. Ward's New Visions In Science
2. Human Relations Media "Bacteria: Invisible Friends and Foes"
3. Body Defenses Against Diseases - Britannica
4. Immune Response Against Common Microorganisms - CRM Films
5. The Isolation and Growth of Global Bacteria
6. International Microbiological Techniques: Media Design Assoc. Inc.
7. Electron Microscopy - New Technologies
8. Transplants: The Immune System At Risk
9. The World of Cell Biology Videodisc
10. Slide presentation on conversion of conventional science labs to research ones
11. Slide presentation on lab techniques and microbiological equipment
12. Slide presentation on highly infectious microbes of the world
13. Instructor's own research project presentations

III. Supplemental reading/lecture materials:

1. Fundamentals of Microbiology, 3rd Ed. Al Casno
2. Microbes of the World, 4th Ed. Seeley/Vandemark
3. Microbial Genetics, Freifelder
4. International Micro, Practical Handbook, CKC, O'Leary
5. Modern Micro, Principles & Applications, Birge

6. Micro with Health Care Application, Benathen
7. Immunology, Benjamin & Leskowitz, 2nd Ed.
8. Human Immunology, Huffer/Kanapa
9. Bacteria Global Engineers, Bryan/Bryan
10. The World of the Cell, 2nd Ed., Becker & Deamer
11. The World Plague, Albert Camey 1913-1960
    Translated from the French, available at KCKCC library
12. Plagues and People of Different Countries,
    William McNeil, 1917, History of Epidemics and
    History of Civilization, available at KCKCC library
13. International Biomedical Journals:
    - New England Journal of Medicine
    - Scientific American
    - Science Magazine
    - Nature Magazine
    - Journal of Infectious Diseases
    - Journal of Microbiology
    - Journal of Molecular Biology
    - Journal of Cell Biology
    - Journal of Immunology
    - Journal of Virology
    - Journal of Tropical Infections
    - International Journal of Medicine

TEACHING STRATEGY AND CLASSROOM PRESENTATION

1. Formal Lectures; include books, articles, journals and audio visual/slide presentations. Class discussions are essential to learning.

2. Students' Written Reports; cover different aspects of the course outline. This will encourage students to be well versed and good writers in the areas of science.

3. Student class discussions/group informal round table discussions.

4. Guest Speaker Presentations: invited international guest speakers will lecture on appropriate topices in their expertise areas. This will allow students to interact with speakers from other countries and ask them questions directly.

COURSE REQUIREMENTS AND EVALUATION OF STUDENTS

A. Grading in General - the FINAL GRADE is based soley on the cumulative grades derived from lecture examinations. No examination may be re-taken for the purpose of elevating the grade. Tests will be given after each chapter of the course.

B. Sources of Grades - the cumulative lecture exam scores will consitute the total course grade. There are no quizzes or make-up exams in the course.

C. Schedule of examinations (1 hour exams @ 100 points each):

Exam #1 .....
Exam #2 .....
Exam #3 .....
Exam #4 .....
Exam #5 .....
Exam #6 .....
Exam #7 .....
Exam #8 .....
Exam #9 .....*final exam is non-comprehensive

D. Examinations will be given during scheduled class times. All exams may be any combination of short answer, multiple choice, completion, essay, and true or false. If religious/ international holidays or emergency circumstances interfere with test dates, special arrangements will be made to complete the exams.

E. Material covered on exams will include everything that the instructor indicates such as readings from the text, class discussions and students' manuals prepared by the Intructor which will include International/Multicultural topics.

F. Cheating - If evidence exists that one or more students have been involved in cheating in any way on an exam, all involved with the cheating will receive a grade of "F" for that exam. Should cheating be proven again for those students, a grade of "F" will be assigned to them for the course.

G. Since grades are based primarily on comprehension of lectures attendance is strongly encouraged and required. The student is responsible, however, for all announcements made during class and for all material which is covered. The administrative drop policy may be used in cases of extensive absences.

H. Return of grades exams will be done as quickly as possible, while insuring the instructor enough time to make adequate evaluations of the work. Graded exams will be reviewed by students and must be returned to the instructor. Graded exams will be given out and collected in lecture.

I. Students are expected to contact the instructor during the posted office hours or make a phone contact only in case of special appointments.

GRADING PROCEDURE

A. Grading - Grades will be assigned according to the following formula:

$$\frac{\text{Points Earned}}{\text{Points Possible (700)}} \times 100 = \% \text{ grade}$$

Conversion of % to letter grades is as follows:

100 - 90% = A
89 - 80% = B
79 - 70% = C
69 - 60% = D
59 & Below = F

B. Final Exam Policy - Final exams in the Science Department must be taken when scheduled. Students who anticipate being unable to take a final exam when scheduled, must contact the instructor prior to the exam time. Make-up final may be arranged at the instructor's discretion only in extreme verifiable emergencies.

C. Incomplete Grade - With regard to "Incomplete" grades, it is a departmental policy that incompletes will be given only cases of illness or death in the immediate family. In such event, contact the instructor as soon as possible to make appropriate arrangements.

D. Course and Instructor Evaluation - At the end of the semster, students will have the opportunity to officially evaluate the instructor and the course and give the instructor any constructive suggestions for improving the course. Such suggestions are encouraged at any time during the semster. Written (signed or unsigned) comments and suggestions are encouraged and appreciated by the instructor.

E. Students' written reports will cover different topics of the outline. These pass/fail "Writing-to-Learn" activities are designed to bring the student closer to the course material. These classroom assignments will eliminate the problem of students' nonparticipation in class.

F. Student classroom discussions will bring the student into contact with students from other cultures. This will enable students to share experiences and bring a real world lab situation to the college classroom.

BIBLIOGRAPHY

1. Revised Syllabus for "Sociology of the Family, SO-108", by Dr. Steve Collins, May 1993.

2. Multiculturalism, A FIPSE Grant, 1993.

3. Developing Multiculturalism, FIPSE Grant proposal by Claire Correll, 1990.

4. NISOD Conference Materials, May 1993.

5. KACC, 23rd Annual Professional Conference, Oct. 1993.

6. Internationalizing/Multiculturizing Science Syllabi and Curricula, a NISOD proposal for May 1994 Conference by Sam Elashkar, Ph.D.

7. Network Scientific World, The newsweekly of an International Data Group Publication, 1993.

8. Biomedical Products "Tools and Techniques for Life Science Researchers, Monthly Publication.

9. American Biotechnology lab, News Edition

10. International Geographic Science, Eductional Services Supplement, 1993.

11. Films and Videos for the Humanities & Sciences, Fall, 1993.

12. Specialized high-technology multimedia, computer software, video programs, CD-Rom, filmstrips on Global/Multicultural issues.

13. Rainin International Product Update Journal, 1993.

14. "American Clinical Lab", Weekly Magazine

15. "American Lab", Weekly Magazine

16. Guidelines for Course Revisions, Office of International/ Multicultural Education, KCKCC, 1993.

17. The brilliant suggestions, comments and guidance of the following colleagues at KCKCC:

A. Dr. Steve Collins
B. Dr. Steve Spartan
C. Dr. John Ryan
D. Dr. Morteza Ardebili
E. Dr. Sumitra Rattan
F. Dr. Charlie Reitz

18. Review of the course materials as listed in the revised syllabus

GENERAL SUGGESTIONS FOR MULTICULTURAL/INTERNATIONAL CURRICULA AND SYLLABI FOR SCIENCE CLASSES

1. Expand the students' horizons and scope of learning by discussing various global cultural and scientific issues.

2. Discussion of new advanced techniques and biotechnology used by different countries.

3. Contributions of the International Scientists to the areas of Science.

4. Collaborative scientific efforts of countries.

5. Discussion of differences amongst people of the world:
   A. Diets & Nutrition
   B. Habits & Customs
   C. Anatomical & Physiological Characteristics
   D. Ecological Rules
   E. Public Health Educational Programs
   F. Geographical location

6. Studying of common global bioethical issues (problems, solutions, and means to deal with them)

7. Establishment of useful interactions and communications between American and International students through classroom group discussions and reports.

8. Invited International guest speakers to lecture on appropriate topics in their expertise areas, "Putting the real world lab at the feet of the student."

9. To become aware of different governments' rules and regulations governing scientific research, drug approval, gene cloning, genetic biotechnology, etc.

10. Studying of Science Educational Systems in various countries (problems and solutions).

11. Nomination Criteria for selecting Nobel Prize Winners in Sciences of Medicine.

12. International/National Scientific conferences and meetings (places and dates).

13. A list of International/National Societies and Associations in the different areas of science (addresses, activities, membership, etc.)

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